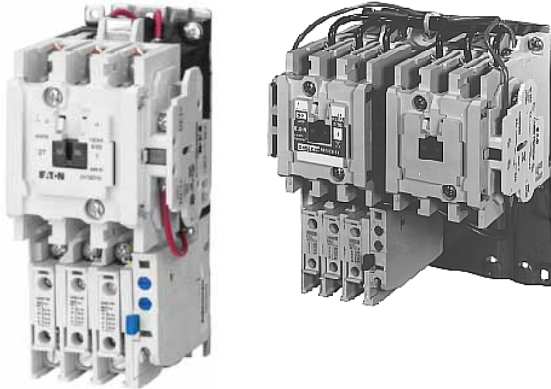


Three-Phase Non-Reversing and Reversing, Full Voltage Starters



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### Starters—Three-Phase Non-Reversing and Reversing, Full Voltage

#### Product Description

##### Non-Reversing

Three-phase, full voltage magnetic starters are most commonly used to switch AC motor loads. Starters consist of a magnetically actuated switch (contactor) and an overload relay assembled together.

##### Reversing

Three-phase, full voltage magnetic starters are used primarily for reversing of three-phase squirrel cage motors. They consist of two contactors and a single overload relay assembled together. The contactors are mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

#### Features, Benefits and Functions

- Bimetallic ambient compensated overload relays—available in three basic sizes covering applications up to 900 hp—reducing number of different contactor/overload relay combinations that have to be stocked. These overload relays feature:
  - Selectable manual or automatic reset operation
  - Interchangeable heater packs adjustable  $\pm 24\%$  to match motor FLA and calibrated for 1.0 and 1.15 service factors. Heater packs for smaller overload relay will mount in larger overload relay—useful in derating applications such as jogging
  - Load lugs built into relay base
  - Single-phase protection, Class 20 or Class 10 trip time
  - Overload trip indication
  - Electrically isolated NO-NC contacts (pull RESET button to test)
- The C440 is a self-powered, robust electronic overload designed for integrated use with Freedom NEMA contactors
  - Tiered feature set to provide coverage specific to your application
  - Broad 5: 1 FLA range for maximum flexibility
  - Coverage from 0.05–1500A to meet all your needs
- Long life twin break, silver cadmium oxide contacts—provide excellent conductivity and superior resistance to welding and arc erosion. Generously sized for low resistance and cool operation
- Designed to 3,000,000 electrical operations at maximum hp ratings up through 25 hp at 600V
- Steel mounting plate standard on all open type starters
- Wired for separate or common control

##### Non-Reversing

- Holding circuit contact(s) supplied as standard:
  - Sizes 00–3 have a NO auxiliary contact block mounted on right-hand side (on Size 00, contact occupies 4th power pole position—no increase in width)
  - Sizes 4–5 have a NO contact block mounted on left side
  - Sizes 6–7 have a 2NO/2NC contact block on top left
  - Size 8 has a NO/NC contact block on top left back and a NO on top right back

##### Reversing

- Each contactor (Size 00–8) supplied with one NO-NC side mounted contact block as standard. NC contacts are wired as electrical interlocks

## Product Selection

### When Ordering Supply

- Catalog number
- Heater pack number (see selection table, **Pages V5-T2-40 to V5-T2-42**) or full load current

**Size 0  
Non-Reversing Starter**



**Size 1  
Reversing Starter**



### Type AN16/AN56 NEMA—Manual or Automatic Reset Overload Relay—Non-Reversing and Reversing <sup>①</sup>

NEMA Size	Continuous Ampere Rating	Service-Limit Current Rating (Amperes) <sup>②</sup>	Maximum UL Horsepower <sup>②</sup>						Three-Pole Non-Reversing <sup>③</sup> Catalog Number	Three-Pole Reversing <sup>③</sup> Catalog Number	Vertical Reversing <sup>③</sup> Catalog Number
			Single-Phase		Three-Phase						
			115V	230V	208V	240V	480V	600V			
00	9	11	1/3	1	1-1/2	1-1/2	2	2	AN16AN0_C	AN56AN0_C	—
0	18	21	1	2	3	3	5	5	AN16BN0_C	AN56BN0_C	AN56BNV0_
1	27	32	2	3	7-1/2	7-1/2	10	10	AN16DN0_B	AN56DN0_B	AN56DNV0_
2	45	52	3	7-1/2	10	15	25	25	AN16GN0_B	AN56GN0_B	AN56GNV0_
3	90	104	—	—	25	30	50	50	AN16KN0_	AN56KN0_	AN56KNV0_
4	135	156	—	—	40	50	100	100	AN16NN0_	AN56NN0_	AN56NNV0_
5	270	311	—	—	75	100	200	200	AN16SN0_B	AN56SN0_B	—
6	540	621	—	—	150	200	400	400	AN16TN0_C	AN56TN0_C	—
7	810	932	—	—	200	300	600	600	AN16UN0_B	AN56UN0_B	—
8 <sup>⑤</sup>	1215	1400	—	—	400	450	900	900	AN16VN0_B	AN56VN0_B	—

### Magnet Coils—AC or DC

Starter coils listed in this section also have a 50 Hz rating as shown in the adjacent table. Select required starter by catalog number and replace the magnet coil alpha designation

in the catalog number ( ) with the proper code suffix from the table.

For Sizes 00–2 and 5–8, the magnet coil alpha designation will be the next to last digit of the listed catalog number.

EXAMPLE: For a 380V, 50 Hz coil, change AN16BN0\_C to AN16BN0LC. For all other sizes, the magnet coil alpha designation will be the last digit of the listed catalog number.

For **DC Magnet Coils**, see Accessories, **Pages V5-T2-28 and V5-T2-29**.

### AC Suffix

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	<b>A</b>
240/60 or 220/50	<b>B</b>
480/60 or 440/50	<b>C</b>
600/60 or 550/50	<b>D</b>
208/60	<b>E</b>
277/60	<b>H</b>
208–240/60 <sup>⑥</sup>	<b>J</b>
240/50	<b>K</b>

Coil Volts and Hertz	Code Suffix
380–415/50	<b>L</b>
550/50	<b>N</b>
24/60, 24/50 <sup>⑦</sup>	<b>T</b>
24/50	<b>U</b>
32/50	<b>V</b>
48/60	<b>W</b>
48/50	<b>Y</b>
48/50	<b>Y</b>

### Notes

<sup>①</sup> Starter catalog numbers do not include heater packs. Select one carton of three heater packs. Heater pack selection, **Pages V5-T2-40 to V5-T2-42**.

<sup>②</sup> Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6	7	8
Horsepower	1-1/2	5	10	25	50	75	150	300	600	900

<sup>③</sup> Underscore ( ) indicates coil suffix required, see AC Suffix table.

<sup>④</sup> The service-limit current ratings represent the maximum rms current, in amperes, which the controller shall be permitted to carry for protracted periods in normal service. At service-limit current ratings, temperature rises shall be permitted to exceed those obtained by testing the controller at its continuous current rating. The current rating of overload relays or trip current of other motor protective devices used shall not exceed the service-limit current rating of the controller.

<sup>⑤</sup> Common control. For separate 120V control, insert letter **D** in 7th position of listed catalog number. Example: AN56VND0CB.

<sup>⑥</sup> NEMA Sizes 00 and 0 only.

<sup>⑦</sup> NEMA Sizes 00 and 0 only. Sizes 1–8 are 24/60 only.

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## NEMA Contactors and Starters

### Freedom Series

#### Two-Speed Selective Control

##### When Ordering Supply

- Catalog number plus magnet coil code suffix.  
Example: Size 0—AN700BN022B
- Heater pack number or full load current for each speed

For two-speed other than selective control:

- Catalog number plus magnet coil code suffix and option required. Example: AN700BN022B except compelling
- Heater pack number or full load current for each speed

**Note:** Two-speed starters are designed for starting and controlling both separate (two-winding) and reconnectable (one-winding) motors. Separate winding, WYE-WYE motors have a separate winding for each speed. Reconnectable, consequent pole motors use the same winding for both speeds. All standard starters are wired for selective control.

##### Two-Winding AN700DN022



#### Separate Winding ①

Maximum Horsepower—60/50 Hertz

Constant or Variable Torque

Constant or Variable Torque				Constant Horsepower				NEMA Size	Open Type Catalog Number
115V	200V	230V	460V/575V	115V	200V	230V	460/575V		
1-1/2	3	3	5	1	2	2	3	0	AN700BN022_
3	7-1/2	7-1/2	10	2	5	5	7-1/2	1	AN700DN022_
—	10	15	25	—	7-1/2	10	20	2	AN700GN022_
—	25	30	50	—	20	25	40	3	AN700KN022_
—	40	50	100	—	30	40	75	4	AN700NN022_
—	75	100	200	—	60	75	150	5	AN700SN022_

Prices of starters do not include heater packs. Select two packs (two overload relays, one for each speed). Heater pack selection, Pages V5-T2-40 to V5-T2-42.

##### One-Winding AN700BN0218



#### Reconnectable Winding ①

Maximum Horsepower—60/50 Hertz

Constant or Variable Torque

Constant or Variable Torque				Constant Horsepower				NEMA Size	Open Type Constant or Variable Torque Catalog Number	Constant Horsepower Catalog Number
115V	200V	230V	460V/575V	115V	200V	230V	460/575V			
1-1/2	3	3	5	1	2	2	3	0	AN700BN0218_	AN700BN0219_
3	7-1/2	7-1/2	10	2	5	5	7-1/2	1	AN700DN0218_	AN700DN0219_
—	10	15	25	—	7-1/2	10	20	2	AN700GN0218_	AN700GN0219_
—	25	30	50	—	20	25	40	3	AN700KN0218_	AN700KN0219_
—	40	50	100	—	30	40	75	4	AN700NN0218_	AN700NN0219_

Prices of starters do not include heater packs. Select two packs (two overload relays, one for each speed). Heater pack selection, Pages V5-T2-40 to V5-T2-42.

##### One-Winding AN700DN0218



#### Magnetic Coils—AC or DC

Coil Voltage and Hz	Code Suffix	Coil Voltage and Hz	Code Suffix	Coil Voltage and Hz	Code Suffix
120/60 or 110/50	A	277/60	H	24/60, 24/50 ②	T
240/60 or 220/50	B	208–240/60	J	24/50	U
480/60 or 440/50	C	240/50	K	32/50	V
600/60 or 550/50	D	380–415/50	L	48/60	W
208/60	E	550/50	N	48/50	Y

##### Notes

① If branch circuit protective device is 45A or greater, C320FBR1 fuse kit(s) may be required for circuit protection per NEC 530-072.

② NEMA Sizes 00 and 0 only. Sizes 1–5 are 24/60 only.

**Kits and Accessories**

- Auxiliary contacts, contactor mounted—**Pages V5-T2-25 to V5-T2-27**
- Transient suppressor, for magnet coil—**Page V5-T2-24**
- Timers—solid-state and pneumatic, mount on contactor—**Page V5-T2-22**

**Renewal Parts  
Publication Numbers**

- See **Page V5-T2-30**

**Technical Data and Specifications**

**Wire (75°C) Sizes—AWG or kcmil—NEMA Sizes 00–2—Open and Enclosed**

NEMA Size	Wire Size <sup>①</sup> Cu Only
<b>Power Terminals—Line</b>	
00	12–16 AWG stranded, 12–14 AWG solid
0	8–16 AWG stranded, 10–14 AWG solid
1	8–14 AWG stranded or solid
2	3–14 AWG (upper) and/or 6–14 AWG (lower) stranded or solid <sup>②</sup>
<b>Power Terminals—Load—Cu Only (stranded or solid)</b>	
00–0	14–6 AWG stranded or solid
1–2	14–2 AWG stranded or solid
<b>Control Terminals—Cu Only</b>	
12–16 AWG stranded, 12–14 AWG solid	

**Wire (75°C) Sizes—AWG or kcmil—NEMA Sizes 3–8—Open and Enclosed**

NEMA Size	Wire Size <sup>②</sup>
<b>Power Terminals—Line and Load</b>	
3	1/0–14 AWG Cu/Al
4	Open—3/0–8 AWG Cu; Enclosed—250 kcmil—6 AWG Cu/Al
5	750 kcmil—2 AWG; or (2) 250 kcmil—3/0 AWG Cu/Al
6	(2) 750 kcmil—3/0 AWG Cu/Al
7	(3) 750 kcmil—3/0 AWG Cu/Al
8	(4) 750 kcmil—1/0 AWG Cu/Al
<b>Control Terminals—Cu Only</b>	
12–16 AWG stranded, 12–14 AWG solid	

**Plugging and Jogging Service Horsepower Ratings <sup>③</sup>**

NEMA Size	200V	230V	460V	575V
00	—	1/2	1/2	1/2
0	1-1/2	1-1/2	2	2
1	3	3	5	5
2	7-1/2	10	15	15
3	15	20	30	30
4	25	30	60	60
5	60	75	150	150
6	125	150	300	300

**Notes**

- ① Minimum per NEC. Maximum wire size: Sizes 00 and 0 to 8 AWG and Sizes 1–2 to 2 AWG.
- ② Two compartment box lug.
- ③ Maximum horsepower where operation is interrupted more than 5 times per minute, or more than 10 times in a 10 minute period. NEMA Standard ICS2-1993 table 2-4-3.

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## NEMA Contactors and Starters

Freedom Series

### Wiring Diagrams

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#### Three-Phase and Single-Phase Applications

